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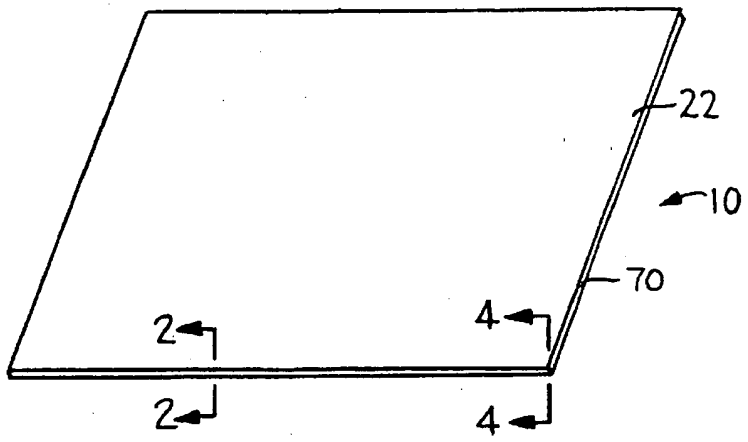
(54) **RECOUVREMENT POUR TABLETTE ET TIRROIR**
(54) **SHELF AND DRAWER LINER MAT**



(57) TRANSLATION NOT AVAILABLE AT THIS TIME

(57) A liner mat is disclosed which is designed for storage of articles such as food and for protection of an area. The liner mat includes an absorbent layer and a bottom surface, the bottom surface having a coefficient of friction greater than about 0.4. The bottom surface of the liner mat should not adhere to the underlying support surface.

ABSTRACT

A liner mat is disclosed which is designed for storage of articles such as food and for protection of an area. The liner mat includes an absorbent layer and a bottom surface, the bottom surface having a coefficient of friction greater than about 0.4. The bottom surface of the liner mat should not adhere to the underlying support surface.

PATENT
12,713

SHELF AND DRAWER LINER MAT

Field of the Invention

This invention relates to a liner mat that is fluid absorptive and temporarily bonded to a substrate. It is particularly directed to disposable liner mats for use with foods and protection of an area such a drawer mat or floor mat.

Background of the Invention

Shelf liners are designed for storage of articles such as food. In addition to providing a surface on which to store the articles, the liners also protect the underlying support surface. The liners can be typically constructed of synthetic polymeric materials. The liners have a tendency to slip on the underlying support surfaces. To overcome this problem, pressure-sensitive adhesives are placed on the back of a liner mat for attachment of the liner to the support surface. The use of such adhesives presents several disadvantages. One disadvantage is that the adhesive may stick too firmly to the support surface and make removal difficult. A second disadvantage is that the adhesive may discolor the support surface or leave a sticky residue, and a third disadvantage is that the liner mat may tear apart at the time of removal. Furthermore, the cost of adhesives is a significant portion of the cost of the liner mat.

Temporary bonding is defined where a liner is bonded to a substrate for an unlimited period of time and where the bond may be easily broken when desired.

U.S. Patent 5,320,895 describes a perforated absorbent pad comprising a laminated tissue absorbent mat sandwiched and sealed between upper and lower plastic sheets. The pad is perforated to develop a series of holes for the passage of liquid from the meat. The lower plastic sheet is generally impermeable to liquids. The pad has a typical thickness of approximately 0.20 inches. Although the patent generally describes meat packing tray absorbent pads, it is adaptable to continuous linear shelf liner material as well as precut sizes of liner material. An optional variant is to incorporate superabsorbent material throughout the interior tissue laminate.

U.S. Patent 4,761,341 describes a temporarily bonded construction utilizing a coating of a non-pressure sensitive hot melt adhesive comprising 5 to 40% of specific A-

B-A block copolymers and a 60 to 95% plasticizing oil. Additionally, the coating may incorporate a tackifying agent which is dependent upon the specific block copolymer employed. The types of rubber block copolymers useful in the coating include Kraton D and G. The types of plasticizing oils useful in the coating include petroleum derived hydrocarbon oils such as polypropylenes and polybutenes having an average molecular weight between about 350 and about 10,000. The coating is employed on a base substrate of paper, plastic, film, sheets and foils. The other surface may include plastic, metal, glass or paper as the item to be temporarily bonded to the base substrate.

U.S. Patent number 4,913,942 describes a desiccant bundle/pouch with front and back porous sheets with a plurality of sealed compartments containing desiccant granules. The purpose is to dehumidify humid or wet environments.

Japanese patent 53,061,559 describes molding an aromatic vinyl system high polymer material into fibrous form and chemically modifying it to impart polar gas absorbing power to it in place of activated carbon in a vessel provided with air holes on one or more faces which are freely opened or closed. The fibrous polymer can be washed with water and regenerated. The primary purpose is to contain foul-smelling gaseous odors. The gaseous odors are allowed to enter the liquid and gas permeable chamber.

Of United States patents, U.S. patent 5,046,604 describes an odor absorbing shelf liner comprising two porous sheets which are stitched together to form a quilted pattern having pouches which contain odor absorbing material.

Japanese patent 58,079,518 describes a liquid state odor absorbing material supported by a porous material and wrapped by a film which is gas permeable but not liquid permeable. The primary purpose is to absorb and contain foul-smelling gaseous odors.

Japanese patent 61,031,162 describes a refrigerator deodorizer which is placed in a water and moisture permeable container made of synthetic resin woven or nonwoven fabric, etc. and set in a refrigerator, car, or house. The primary purpose is to absorb and contain foul-smelling gaseous odors.

Summary of the Invention

Briefly, the present invention relates to an improved shelf, drawer and area liner. The disclosed present invention describes several embodiments which enhance the performance, reduce the cost, reduce the number of components, and simplify the

construction of this product. The liner of the present invention could be utilized for a number of other uses. For example, the liner could be used as a cabinet shelf and drawer liner, a microwave liner, a place mat, drop cloth for painting, car and floor mats, bed pads or other purposes where skid resistance and absorbency are required.

The general object of the present invention is a liner mat which provides a surface which compares with the traditional liner materials, is disposable and yet provides for absorption of fluids normally encountered in the liner use.

Another object of the present invention is to provide a liner mat which is easy to manufacture and is relatively low in cost.

Yet another object of the present invention is to provide a product which does not require a pressure-sensitive adhesive, but will adequately maintain its position with respect to the underlying surface.

Still further, an object of the present invention is to provide a liner mat which has improved fluid absorbency features.

Yet another object of the present invention is to provide a liner mat which may be distributed and stored in a rolled form prior to use without the contacted surfaces adhering to each other and without the use of a separation sheet.

Other objects and advantages of the present invention will become more apparent to those skilled in the art in view of the following description and the accompanying drawings.

Brief Description of the Drawings

Fig. 1 is a perspective view of a liner mat of the present invention.

Fig. 2 is a cross-sectional view of a first embodiment of the liner mat taken across the mat at section 2-2 of Fig. 1.

Fig. 3 is a cross-sectional view of a second embodiment of the liner mat taken across the mat at section 2-2 of Fig. 1.

Fig. 4 is a cross-sectional view of a third embodiment of the liner mat taken across the mat at section 4-4 of Fig. 1.

Fig. 5 is a top view of shim material used in the Coefficient of Friction testing showing the dimensions of the shim material.

Fig. 6 is a side view of shim material used in the Coefficient of Friction testing showing the folded shape prior to installation on the testing sled.

Fig. 7 is a side view of sled used in the Coefficient of Friction testing showing the

sled after the installation of the slim material dimension of the shim material.

Detailed Description of the Invention

With reference to Fig. 1, a liner mat 10 is shown having an absorbent layer 22 having a top surface in contact with the items being stored and a bottom surface (not shown). The bottom surface should have a coefficient of friction greater than about 0.50, more preferably greater than about 0.75, and most preferably greater than about 1.0. The coefficient of friction of the bottom surface is preferably greater than the coefficient of friction of the top surface of the liner mat 10. The bottom surface should not adhere to the underlying support surface. With respect to not adhering to the support surface, the force to peel the nonskid layer from the support surface should be not greater than about 50 grams/inch. The peel force is that measured by peeling a liner mat from a stainless steel plate according to ASTM-D 3330. The peel force of the more preferably 0 grams/inch. The liner mat 10 is designed primarily to absorb food and beverage spills which occur in the refrigerator during normal usage. Typical fluids which are encountered using the liner mat include fruit, vegetable, meat and poultry fluids including blood and other animal body fluids. In addition the liner mat will reduce foul odors, may be used to prolong the freshness of stored vegetables by absorbing unwanted moisture which promotes decay, and may be used to absorb juices when defrosting in the refrigerator.

A desirable length dimension for the liner mat 10 should be not more than about 50 inches or less than about 5 inches, more preferably not more than about 20 inches or less than about 8 inches, and most preferably not more than about 17 inches or less than about 11 inches. A desirable width dimension for the liner mat 10 should not be more than about 40 inches or less than about 4 inches, more preferably not more than about 18 inches or less than about 6 inches, and most preferably not more than about 15 inches or less than about 9 inches. The length and width dimensions are for a flat mat. The dimensions for a liner mat in roll form could be any length or width suitable for distribution or shipping, but should be dimensionable by tear lines or other means to the sizes indicated for the flat mat.

The support surface on which the liner mat 10 is placed may be a solid shelf, a wire shelf, flooring, lawn grass, bedding and the like.

The liner mat 10 should have a thickness of less than about 15 mm, preferably

less than about 10 mm, and most preferably, less than about 5 mm. The thickness is measured using method of ASTM D645-92 test. The thickness should be an average of four or more locations on the liner mat.

Referring to Fig. 2, the liner mat 10 includes an absorbent layer 22 and nonskid layer 24. Absorbent layer 22 can be any shape. The top surface of absorbent layer 22 contacts the shelf items. Absorbent layer 22 can be secured, or retained on the top side of nonskid layer 24. The nonskid layer should have the same dimensions as absorbent layer 22. The bottom surface of nonskid layer 24 will contact the support surface.

Referring to Fig. 3, the liner mat 10 includes an absorbent layer 22, nonskid layer 24, and liquid impermeable layer 26. Absorbent layer 22 can be any shape. The top surface of absorbent layer 22 contacts the shelf items. Absorbent layer 22 can be secured, or retained on the top side of liquid impermeable layer 26. The nonskid layer should have the same dimensions as the liquid impermeable layer 26. The bottom surface of nonskid layer 24 will contact the support surface.

Referring to Fig. 4, the liner mat 10 includes a top layer 20, which is liquid permeable, an absorbent layer 22, nonskid layer 24, and liquid impermeable layer 26. Absorbent layer 22 can be any shape and preferably does not extend beyond top layer 20. Top layer 20 has a top surface which contacts the shelf items. Absorbent layer 22 can be secured, or retained on the top side of liquid impermeable layer 26. The nonskid layer 24 should have the same dimensions as the liquid impermeable layer 26. The bottom surface of nonskid layer 24 will contact the support surface.

In another aspect of the present invention, it is desirable to have the shelf and drawer liner mat curl slightly downward when installing and throughout its usage life. Since items enter refrigerator shelves from the front, the leading edge 70 of the liner mat is the most likely edge to interfere with the items being passed or slid over it. The greater the upward curl, the greater the likelihood that leading edge 70 will become bent or folded. The curl effect can be measured by using modified cantilever bend test IST 90.1-92. The test is modified so samples surfaces with a COF > 0.5 were powdered with talc, and only MD flexural rigidity is measured for the top, i.e. bottom surface against the horizontal platform, and the bottom, i.e. top surface against the horizontal platform. The ratio of top layer MD flexural rigidity to the bottom layer MD flexural rigidity of less than about 10 is desirable, more preferably less than about 5 and most preferably less than about 1. The curl effect can also be imparted by embossing the

liner mat after it has been laminated.

In yet another aspect of the present invention, the ability of the liner mat to fold and mold into a refrigerator or drawer requires that the liner mat have a stiffness as measured by the Gurley stiffness test of less than about 5,000 mg, more preferably less than about 2,000 mg, and most preferably less than about 750 mg.

The most preferred method of construction is continuous attachment of the absorbent layer with no border at the edge. The liquid impermeable bottom layer 24 may be coextensive with the liquid permeable top layer 20 and is adhered to the top layer 20 in those areas where the top layer 20 and the bottom layer 24 are in face to face contact. The method of adhering the top layer 20 to the bottom layer 24 may be any suitable method that does not leave an edge which is susceptible to leakage. Typical of sealing methods are heat sealing and adhesive sealing. Another method is ultrasonically bonding on a line inward from the edge of the liner mat 10. When this is done, a free fringe of material may extend about a quarter inch outward from the bond line about the periphery of the product. This results in a neat bond line with less tendency for the material to be perforated than by heat sealing. The most preferred embodiment does not have a free fringe edge.

The purpose of the top layer 20 is to increase the durability of the top surface, provide a layer of lower coefficient of friction, and allow liquid to penetrate through it into absorbent layer 22.

A suitable top layer 20 can be manufactured from a wide selection of web materials, such as porous foams, reticulated foams, apertured plastic films, natural fibers, (for example, wood or cotton fibers), synthetic fibers (for example, polyester or polypropylene fibers), or a combination of natural and synthetic fibers. Various woven and nonwoven fabrics can be used for top layer 20. For example, top layer 20 may be composed of a meltblown, or spunbonded web of polyolefin fibers. The top layer 20 may also be a bonded-carded-web composed of natural fibers, synthetic fibers, or combinations thereof. In addition top layer 20 may also be a hydroentangled natural fiber/nonwoven composite.

Top layer 20 may be composed of a substantially hydrophobic material, and the hydrophobic material may optionally be treated with a surfactant or otherwise processed to impart a desired level of wettability and hydrophilicity. The liquid permeable top layer 20 can also be treated with a surfactant to make it more hydrophilic and, thereby, aid in

the absorption of the liquid. The surfactant can include topical additions or internally applied materials like polysiloxanes. The top layer 20 may be coated with a grease or stick-resistant mat rial, thus permitting materials to be easily removed. The top side of the top layer 20 may be provided with a decorative pattern. If desired, the pattern may be chosen such that the hand tear lines blend in or form a part of the pattern. The liner mat 10 may be provided with walls to further contain the fluids released during storage.

Another preferred material for the top layer 20 is a spunbond web of polypropylene. The web can contain about 1% to about 6% titanium dioxide pigment to give it a clean, white appearance. A uniform spunbond material is desirable, because it has sufficient strength to resist being torn or pulled apart during use. The most preferred polypropylene webs have a weight of between about 14 to 60 grams per square meter. An optimum weight is between about 30 grams per square meter and about 40 grams per square meter.

Liquid permeable top layers utilized on liner mats can be comprised of a white material. White material has good fluid-masking properties and can hide the stain of liquid that has passed through it. In addition, the aesthetics of the liner mat can be enhanced by printing graphics on the top surface of the top layer 20 which may include usage instructions.

The liquid permeable top layer 20 can also contain a plurality of apertures (not shown) formed therein. With apertures present, fluids released during storage, which are deposited at or near the apertures, rapidly migrate into the absorbent layer 22. This helps maintain a perceivably drier surface than when the apertures are not employed. Therefore, while the apertures are not essential, some functional advantages are obtained.

In the most preferred embodiment, composite materials can be made with a combination of natural fibers and synthetic components. Combining synthetic components with natural fibers increases the hydrophilicity of the composite reducing or eliminating the need for surfactant, while at the same time providing high strength and durability. This combination allows for the elimination of the top layer. An example of a material that meets this criteria is a wet formed tissue formed by the double recreping process with a total basis weight of 52 pounds/ream and a latex add-on of 1.5 to 2.0 pounds/ream. The trade name for this material is WypAll®, a latex printed wet formed tissue available from Kimberly-Clark Corporation.

An alternate material that also meets this criteria is a hydroentangled nonwoven spunbonded polypropylene fabric composed of about 2.8 to about 3.2 denier fibers having a basis weight of about 14 gsm hydroentangled into pulp fibers having a basis weight of about 53 gsm using high pressure water jets. The trade name for this material is HYDROKNIT®, a hydroentangled nonwoven cellulose composite material available from Kimberly-Clark Corporation.

The top surface of the liner mat should have a coefficient of friction less than the coefficient of friction of bottom surface of the liner mat. This is desirable to facilitate sliding of food items over the surface without causing the liner mat to slide or bunch. This can be accomplished by making the top surface out of a material with a lower coefficient of friction, by reducing the contact surface area by means such as embossing, perforating, micro-straining, or creping or by adding discontinuous bands of low coefficient of friction material to reduce the surface contact and friction between the items that are slid on the shelf and drawer liner mat.

The absorbent materials used in the liner mat 10 are designed to absorb the material fluids, including juices, wash water and blood. An acceptable level of absorbency (the weight is divided by the sample area) is preferably greater than 0.01 grams/in^2, more preferably greater than .05 grams/in^2, and most preferably greater than 0.20 grams/in^2. Suitable materials include wood pulp fluff, rayon, cotton and meltblown polymer, such as polyester, polypropylene or coform. Coform is a meltblown air-formed combination of meltblown polymers, such as polypropylene, and absorbent staple fibers, such as cellulose. A preferred material is a wet formed tissue made using the double recreping tissue process, as it is low in cost, relatively high in durability and has good absorbency.

The absorbent material may be a composite comprised of a hydrophilic material that can be formed from various natural or synthetic fibers, wood pulp fibers, regenerated cellulose or cotton fibers, or a blend of pulp and other fibers. An alternate material is an air laid tissue.

The absorbent layer 22 may contain superabsorbent particles which are extremely effective in retaining released fluids. Superabsorbents have the ability to absorb a large amount of fluid in relation to their own weight. Typical superabsorbents used in liner mats can absorb anywhere from 5 to 60 times or more their weight in fluids. However, the absorption mechanism of the superabsorbents is usually slower than the rate of fluid

absorption by matrix material. The placement of the superabsorbent particles in the central portion of the liner mat 10 provides additional time for the superabsorbent particles to absorb the fluid temporarily retained by a transfer member.

The superabsorbents should have a high mechanical stability in the swollen state, an ability to rapidly absorb fluid, and a strong liquid binding capacity to perform well in liner mat applications. Hydroxyfunctional polymers may be found to be good superabsorbents. The superabsorbent can be a hydrogel-forming polymer composition which is water-insoluble, slightly cross-linked, and partially neutralized. It can be prepared from unsaturated polymerizable, acid group-containing monomers and cross-linked agents. A hydrogel-forming polymer, which is a partially neutralized cross-linked copolymer of polyacrylic acid and polyvinyl alcohol, is preferred. After a polymer is formed, it is mixed with about a 1% anhydrous citric acid powder. The citric acid has been found to increase the ability of the superabsorbent to absorb blood. The finely ground, anhydrous citric acid powder, which is void of water, along with trace amounts of fumed silica, is mixed with the polymer which has been screened to an appropriate particle size. This mixture can then be formed into a composite or a laminate structure. Such superabsorbents can be obtained from Dow Chemical, Hoechst-Celanese, and Stockhausen, Inc., among others, and are a partially neutralized salt of cross-linked copolymer of polyacrylic acid and polyvinyl alcohol having an absorbency under load value above 25 gram per gram.

More preferably, the absorbent layer 22 will be one layer of uniform thickness. Alternately, absorbent layer 22 can be composed of two or more absorbent layers with uniform thickness and having various combinations of thickness relative to each other. Alternately, liner mat 10 can have a uniform thickness with higher absorbency material located in the center portion than at the ends. Higher absorbency may be achieved by using fibers of greater absorbency or by adding superabsorbents to the bottom absorbent layer (the layer closer to the bottom surface). Alternately, a lower density bottom absorbent layer will distribute fluid at an increased rate in the x-y directions. The higher density bottom absorbent layer will increase fluid flow in the z direction away from the first absorbent layer, resulting in a drier first absorbent layer.

The top absorbent layers can be made up of a wet formed tissue sheet and the bottom absorbent layer can be made up of meltblown polypropylene. In another embodiment, the top absorbent layer can be a composite comprised of meltblown fibers

and a superabsorbent. The top absorbent layer can also be a laminate comprised of a hydrocolloid material enclosed in a wet formed tissue sheet.

The liquid impermeable layer 26 blocks th passage of fluids and liquids from the absorbent layer 22. The liquid impermeable layer 26 can be made from any desired material that has this properties. A good material is a microembossed, polymeric film, such as polyethylene or polypropylene. Bicomponent films can also be used. A preferred material is polyethylene film. Most preferably, the liquid impermeable layer 26 will be comprised of a polyethylene film having a thickness in the range of from about 0.01 to about 0.05 mm.

Nonskid layer 24 prevents shelf and drawer liner mat 10 from sliding or bunching when sideways force is applied to top layer 20. The materials suitable for nonskid layer 24 may be manufactured from a wide selection of forms, such as porous foams, reticulated foams, plastic films, various woven and nonwoven fabrics, intermittent coatings, or continuous coatings. Nonskid layer 24 can be applied to liquid impermeable layer 26 by means such as coating, or printing. Materials such as silicon rubber, natural rubber, or latex are examples of possible nonskid materials that could be used. Nonskid layer 24 can be added as a discontinuous layer or as a continuous layer. Generally, the coating is applied to a large portion of the liner mat's back surface. However, depending on the liner mat's size and the nonskid properties of the particular coating utilized, it may be necessary to only coat a portion of the back surface of the liner mat. In some cases it may be adequate to place patches of the film or coating on the exterior surface. The nonskid film or coating may be applied to any of a variety of application methods.

In the most preferred embodiment, the liquid impermeable layer 26 and the non-skid layer 24 are supplied by a coextruded film, with a thickness of about 0.75 mils. The coextruded film may be composed of about 75% by weight layer of polyethylene and about 25% by weight layer of polyolefin. A suitable type of polyolefin is KRATON-G block copolymer available from Shell Chemical Company. A suitable coextruded film is identified by the identification number XC2-21-825.1 and is available from Consolidated Thermoplastics Company. The polyethylene liquid impermeable layer is adhered to absorbent layer 22 with hot melt adhesive. The nonskid layer 45 preferably covers the entire exterior surface of liquid impermeable layer 26.

Nonskid liquid impermeable layer may include a monolayer film composed of a

material that will provide the desired COF such as Kraton, polyolefins made using the Metallocene technology, or ethyl vinyl acetate. A disadvantage of a monolayer film composed of a material that has a high COF is that the film might become blocked when the roll is wound. In addition, KRATON copolymer; polyolefins such as made using Metallocene technology and available from Consolidated Thermoplastics Company; and ethyl vinyl acetate are more expensive than polyethylene and will result in a substantially higher cost film as compared to a monolayer polyethylene film.

A more preferred method of constructing nonskid liquid impermeable layer is to cast a coextruded film with the desired level of COF on one side and a lower level on the other. With this method it is possible to coextrude a thin nonskid layer of high COF material such as Kraton, polyolefin made using the Metallocene film technology, or ethyl vinyl acetate on a lower cost/lower COF polymer layer composed of a material such as polyethylene. Nonskid layer is preferably less than 99% of the total weight of the film composite, more preferably less than 50% of the total weight of the film composite, and most preferably less than 25% of the total weight of the film composite.

The nonskid layer 24 can be adhesively or ultrasonically attached to absorbent layer 22, or more preferably, nonskid barrier layer 24 can be extruded directly onto absorbent layer 22. This embodiment reduces the number of construction steps, eliminates the need for adhesive layer between the absorbent layer and the nonskid layer, and reduces the stiffness of the composite web.

The materials suitable for nonskid layer 24 may be manufactured from a wide selection of forms, such as porous foams, reticulated foams, plastic films, various woven and nonwoven fabrics, intermittent coatings, or continuous coatings. The materials suitable for this layer may be any polymer, hot melt, latex, or silicone which has sufficient skid resistance properties to hold the liner mat in place with respect to the support surface during use. The layer may be generally smooth, pore-free and nonporous after application to the liner mat. Alternatively, the non-skid layer can be porous such as a polyethylene foam which is adhesively attached to the liquid *impermeable* layer.

The coefficient of friction of the exterior surface of the nonskid layer 26 is measured by a modification to ASTM test number D-1894-93. ASTM test method D-1894-93 covers determination of the coefficients of starting and sliding friction of plastic film and sheeting when sliding over itself or other substances at specified test conditions. The

test samples were measured by a modification of ASTM test D-1894-93. The modified test calls for determination of sliding friction of the exterior of the bottom surface layer by wrapping a 200 gram sled with brass shim stock and sliding the sled with shim stock over the test sample at 0.5 feet/minute. Using this test a coefficient of friction of greater than 0.4 has been found to be satisfactory. A preferred coefficient of friction is greater than about 1. Preferably, the layer has a coefficient of friction of between 0.4 and 10.0, more preferably between 1.0 and 5.0, and most preferably between 2.0 and 4.0.

The nonskid coatings may have any suitable composition. Generally, the following groups of materials have adequate nonskid properties: ethylene vinyl acetate copolymers applied as a hot melt or as a water based coating having at least 28% vinyl acetate; polyvinyl acetate in water-based emulsions; styrene-butadiene in an emulsion or as a hot melt; cellulose acetate butyrate in a hot melt; ethyl cellulose blended with a plasticizer and a resin and applied as a hot melt; acrylics in an emulsion systems that are not blended; synthetic rubber hot melt (KRATON® block copolymers having elastomeric and styrenic blocks), rubber, resin, plasticizer blends and other hot melts including polyethylene (alone or blended), polyamides).

Typical of such compositions are the ethylene-vinyl acetate copolymers, acrylic terpolymers of methacrylic acids, acrylic copolymers, ethylene-vinyl acetate/resin latex emulsions, ethylene-vinyl acetate hot-melt adhesives, synthetic rubber (block copolymers with elastomeric and styrenic components) hot melt adhesives, and polyvinyl acetate/resin emulsions. Such materials are available from H. B. Fuller Company, E.I. DuPont and Findley Adhesives, among others. Compositions of these types have found use as hot-melt and water-based coatings for barrier coatings for nonwovens and/or papers.

The nonskid layer 24 and the liquid impermeable layer 26 may be unitary, i.e. one layer of material may provide both functions.

In the most preferred embodiment of the present invention the liner mat includes a 52 pound/ream double recreped tissue to which an odor reducing/absorbing material such as baking soda has been applied. The absorbent layer is extrusion coated with a coextruded polyethylene / KRATON film.

The tear lines may be made according to a number of techniques including perforation or embossing of the surface. The tear line also can be formed by other m thods such as scoring or compression molding. The preferred tear lines are

perforations. The tear lines also can be formed in a nip created by a metal embossing roll and a metal roll, inst ad of rubber roll. This method is desirable where the top surface of the top layer 20 is to be printed upon since a raised surface might interfere with some printing operations.

Examples

Description of Examples:

Example 1: VIVA ULTRA paper toweling; UPC code 5400019550

Example 2: Rubbermaid Con-Tact decorative covering; Quick Start backing; UPC code 7169160928; Boardwalk pattern.

Example 3: Rubbermaid Grip liner, UPC code 7169109509

Example 4: Composite liner; the absorbent layer is composed of HANDI-WIPES Heavy Wipes reusable cleaning cloths made by Colgate-Palmolive Company; the adhesive used to laminate the absorbent layer and the nonskid layer together is approximately a 10 GSM layer of Findley hot melt adhesive H2096; and the nonskid layer is a 2-layer coextruded polyethylene/KRATON film 0.75 mil in thickness made by Consolidated Thermoplastics Company; film designation number SC2-91-825.1.

Example 5: Composite liner; the absorbent layer is composed of an unembossed 87 GSM HYDROKNIT sheet which is a hydroentangled web of 0.4 OSY polypropylene spunbond and 74 GSM virgin pulp; the adhesive is approximately a 10 GSM layer of Findley hot melt adhesive H2096; and the nonskid layer is a 2-layer coextruded polyethylene/KRATON film 0.75 mil in thickness made by Consolidated Thermoplastics; film designation number XC2-91-825.1.

Example 6: Composite liner; the absorbent layer is composed of an embossed 52 pound/ream double recreped tissue with (embossing with a 0.375 inch diamond pattern/0.0625 land width/1.125 flat/40 durometer rubber roll) extrusion coated with a two layer coextruded polyethylene/KRATON film 0.75 mill in thickness. The composition absorbent/film was made by Consolidated Thermoplastics; the composite is designated number XLAM-919-P-321.0.

Gurley Stiffness

The force needed to bend each sample is measured using a Gurley Model 4171-d Digital Stiffness Tester which along with weights and calibration strips are available through Teledyne Gurley, Troy, N.Y. The Gurley stiffness test procedure is modeled after the Technical Association of the Pulp and Paper Industry (TAPPI) method T 543

pm-84. The Gurley Digital Stiffness Tester is an instrument consisting of a balanced vane, which is center-pivoted, and to which a variety of weights can be added below its pivot point. The van moves freely to accommodate testing in both left and right directions which would be analogous to upward and outward body flexing of the samples.

There is a two part calibration to the Gurley Stiffness Tester. The first calibration is done to ensure that the "Vane" pendulum is swinging according to specification against a known material (i.e., a brass strip). The Gurley instrument is calibrated following the Gurley Digital Stiffness Tester Instruction Manual to within 5% variation with a 50.8 mm wide by 25.4 mm long Brass Calibration Strip, Gurley part no. 31644. The second calibration is done to ensure that the internal electronic calculations and conversions are accurate. The samples were cut from each liner example are 50.8 mm wide by 38.1 mm long. Each sample overlaps the top of the Gurley vane by 6.4 mm. During a test, the sample is moved against the top edge of the vane until the sample bends and the vane releases contact with the bottom edge of the sample. The point of release is measured by an electronic optical encoder which provides a greater degree of accuracy over the earlier model Gurley Stiffness Tester as was used in TAPPIT 543 pm-84. The electronic optical encoder also displays the result on the digital readout. The readout continuously displays readings from tests performed in both the left and right directions. The Gurley Model 4171-d also computes automatically through an internal microprocessor and displays the average of left and right bending stiffness data after each measurement. The average reading is then converted by this Gurley instrument into milligrams of Gurley stiffness relative to a sample size of 25.4 mm wide by 76.2 mm long.

The Gurley Stiffness Tester should be set up as follows. The required weight is attached and the base of the instrument is leveled by adjusting the leveling screw until the level's bubble is centered and the pendulum's pointer is indicating zero. The switches are set to correspond to the weight being used, the weight's position on the pendulum, the width of the specimen being tested, and the length of the specimen: The test procedure to be performed is as follows:

1. Center the specimen strip over the pendulum such that exactly 6.4 mm (0.25 inches) overlaps the top of the pendulum and exactly 6.4 mm (0.25 inches) will be held in the jaws.

2. Select an appropriate weight and a hole to give a reading between 2 and 6 on the scale. The specimen should be brought to an approximate contact with the pendulum vane before applying force to avoid oscillation in the early stages.
3. Press the System Reset button. The display must read 00-000-00.
4. Press the Motor-Direction switch to cause the clamp arm to press the specimen against the pendulum.
5. Repeat step 4 in the opposite direction to establish both a left scale reading, a right scale reading, and an average reading.
6. Record the average scale reading.
7. Press the Select Button to attain the milligram calculation and record.
8. Repeat steps 1 through 7 for each specimen.

The following procedure should be used to obtain Gurley stiffness samples. A set of samples should be taken from each example. Five samples measuring 50.8 mm by 38.1 mm are cut from each liner. The five samples from each liner should be cut and handled carefully so as not to affect the sample stiffness. The Gurley stiffness is measured for each sample and the values are recorded. The average for the stiffness is calculated and recorded. The film side of examples 2 through 6 were dusted with Johnson's baby powder, IPC code 8137-003052, made by Johnson & Johnson Consumer Products Inc., Skillman NJ 08558-9418. The results are presented in Table 1.

Coefficient-of-Friction:

The coefficient of friction of the exterior of the bottom surface of cutting mat examples were measured by a modification to ASTM test number D-1894-93. ASTM test method D-1894-93 covers determination of the coefficients of starting and sliding friction of plastic film and sheeting when sliding over itself or other substances at specified test conditions. The test samples were measured by a modification of ASTM test D-1894-93. The modified test calls for determination of sliding friction of the exterior of the bottom surface layer by wrapping a 200 gram sled with brass shim stock and sliding the sled with shim stock over the test sample at 0.5 feet/minute. Test equipment used includes TMI Monitor slip and friction tester Model number 32-06, a 200 gram sled, serial number A28734, and 0.005" (0.127 mm) brass shim stock standard surface 90 which was assembled as follows: Shim stock made by Precision Brand Products Inc., UPC Code 17305 (1755) is cut and shaped as shown in Figures 5 and 6. The shim stock standard

surface 90 has a dimension 70 of 2.55 inches, a dimension 72 of 3.235 inches, a dimension 74 of 0.375 inches, and a dimension 76 of 0.31 inches. Standard surface 90 is bent along lines 78 and 80 as shown in Fig. 5 into a j-shaped configuration as shown in Fig. 6. The bend lines have a radius of about 0.05 inches. The standard surface 90 is attached to the 200 gram sled as shown in Fig. 7. Test equipment used included TMI Monitor slip and friction tester Model number 32-06, and 200 gram sled, serial number A28734. The results are presented in Table 1.

TABLE 1

EXAMPLE	COF TOP SURFACE	COF BOTTOM SURFACE	GURLEY STIFFNESS (mg)
1	0.546	0.563	44.9
2	0.271	>10	91.1
3	1.935	2.095	469
4	0.392	6.097	117.3
5	0.299	5.750	695.2
6	0.446	3.094	36.5

Absorbent Capacity:

For absorbent capacity, the following test procedure was used. Test equipment used included balance scale accurate to 0.01 gram and dipping container of 0.9% saline solution. The saline solution was maintained at 35 + or - 1 degree C. Three 2.5 inch by 2.5 inch samples of example were tested. Each sample was weighed and the dry weight recorded to 0.01 gram. Each sample was then submerged in the saline solution for 15 seconds. It was then removed and allowed to drain while one corner was gripped with tongs. Each sample was then weighed and the wet weight recorded to 0.01 gram. The capacity was determined by subtracting the dry weight from the wet weight and dividing by the area of the sample. The results for absorbent capacity are presented in Table 2.

TABLE 2

EXAMPLE	ABSORBENT CAPACITY (g/in^2)
1	0.474
2	0.015
3	0.132
4	0.394
5	0.312
6	0.332

Stiffness:

The stiffness of the top surface of the liner mat and the bottom surface of the liner mat was measured by INDA Standard Test 90.1 - 92. The test is modified such that surfaces of samples with a COF > 0.5 were powdered with talc. Additionally, only MD flexural rigidity is measured for the top, e.g., bottom surface of the liner against the horizontal platform, and for the bottom, e.g., the top surface of the liner against the horizontal platform. A ratio of top MD flexural rigidity to the bottom MD flexural rigidity was calculated. The results are presented in Table 3.

TABLE 3

EXAMPLE	FLEX RIGIDITY RATIO TOP / BOTTOM
1	0.57
2	1.35
3	0.59
4	0.25
5	0.39
6	0.19

While the invention has been described in conjunction with several specific embodiments, it is to be understood that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, this invention is intended to embrace all such alternatives, modifications and variations which fall within the spirit and scope of the appended claims.

We Claim:

1. A disposable liner mat for storage of items comprising an absorbent layer having a top surface in contact with the items and a bottom surface in contact with a support surface, the bottom surface has a coefficient of friction greater than about 0.4 and does not adhere to the support surface, wherein the absorbent layer is formed of a liquid absorptive material to absorb liquid released by the stored items thereby preventing liquid from spilling from the mat.

2. A disposable liner mat of claim 1 wherein the absorbent capacity of the absorbent layer is greater than about 0.01 g of released liquid per square inch of mat.

3. A disposable liner mat of claim 1 wherein the mat has a thickness less than about 15 mm.

4. A disposable liner mat of claim 1 wherein the mat comprises additionally of a liquid impervious layer between the absorbent layer and the bottom surface.

5. A disposable liner mat of claim 1 wherein the mat comprises additionally antibacterial ingredients.

6. A disposable liner mat of claim 1 wherein the mat has a Gurley stiffness less than about 5000 mg.

7. A disposable liner mat of claim 4 having a thickness less than about 15 mm.

8. A disposable liner mat of claim 1 wherein the liner mat comprises additionally a liquid impervious layer associated with the absorbent layer and located between the absorbent layer and the bottom surface.

9. A disposable liner mat of claim 8 wherein the mat comprises antibacterial ingredients.

10. A disposable liner mat of claim 1 wherein the mat comprises additionally a top layer associated with the absorbent layer and between the absorbent layer and the top surface.

11. A disposable liner mat of claim 1 wherein the mat comprises additionally a bottom layer associated with the absorbent layer and between the absorbent layer and the bottom surface.

12. A disposable liner mat of claim 10 wherein the mat comprises additionally a bottom layer associated with the absorbent layer and between the absorbent layer and the bottom surface.

13. A disposable liner mat of claim 11 wherein absorbent capacity of the absorbent layer is greater than about 0.01 g of released liquid per square inch of mat.

14. A disposable liner mat of claim 12 wherein the ratio of top layer MD flexural rigidity to bottom layer MD flexural rigidity is less than about 10.

15. A disposable liner mat of claim 13 wherein the ratio of top layer MD flexural rigidity to bottom layer MD flexural rigidity is less than about 10.

16. A disposable liner mat for protection of an area comprising an absorbent layer having a top surface in contact with the items and a bottom surface in contact with a support surface, the bottom surface has a coefficient of friction greater than about 0.4 and does not adhere to the support surface, wherein the absorbent layer is formed of a liquid absorptive material to absorb liquid encountered in protection of an area thereby preventing liquid from spilling from the mat.

17 A disposable liner mat of claim 16 wherein the absorbent capacity of the absorbent layer is greater than about 0.01 g of released liquid per square inch of mat.

18. A disposable liner mat of claim 16 wherein the mat has a thickness less than about 15 mm.

19. A disposable liner mat of claim 16 wherein the mat comprises additionally of a liquid impervious layer between the absorbent layer and the bottom surface.

20. A disposable liner mat of claim 16 herein the mat comprises additionally antibacterial ingredients.

21. A disposable liner mat of claim 16 herein the mat has a Gurley stiffness less than about 5000 mg.

22. A disposable liner mat of claim 19 having a thickness less than about 15 mm.

23. A disposable liner mat of claim 16 wherein the liner mat comprises additionally a liquid impervious layer associated with the absorbent layer and located between the absorbent layer and the bottom surface.

24. A disposable liner mat of claim 23 wherein the mat comprises antibacterial ingredients.

25. A disposable liner mat of claim 16 wherein the mat comprises additionally a top layer associated with the absorbent layer and between the absorbent layer and the top surface.

26. A disposable liner mat of claim 16 wherein the mat comprises additionally a bottom layer associated with the absorbent layer and between the absorbent layer and the bottom surface.

27. A disposable liner mat of claim 25 wherein the mat comprises additionally a bottom layer associated with the absorbent layer and between the absorbent layer and the bottom surface.

28. A disposable liner mat of claim 26 wherein absorbent capacity of the absorbent layer is greater than about 0.01 g of released liquid per square inch of mat.

29. A disposable liner mat of claim 27 wherein the ratio of top layer MD flexural rigidity to bottom layer MD flexural rigidity is less than about 10.

30. A disposable liner mat of claim 28 wherein the ratio of top layer MD flexural rigidity to bottom layer MD flexural rigidity is less than about 10.

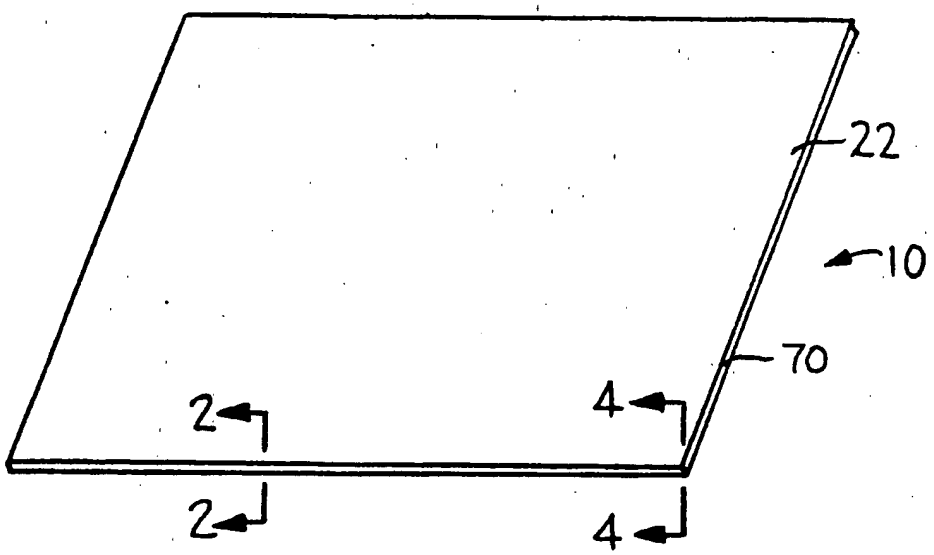


FIG. 1

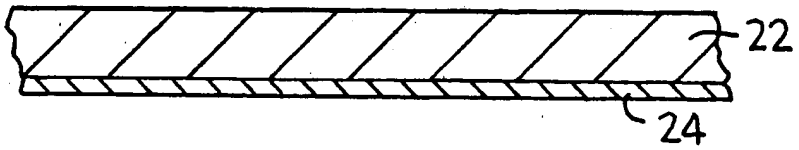


FIG. 2

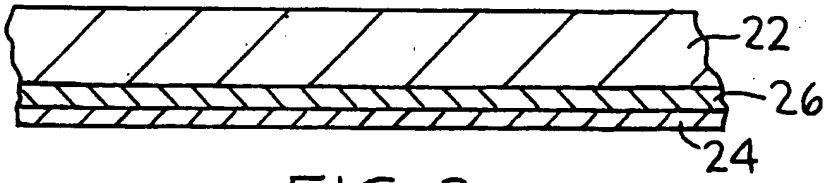


FIG. 3

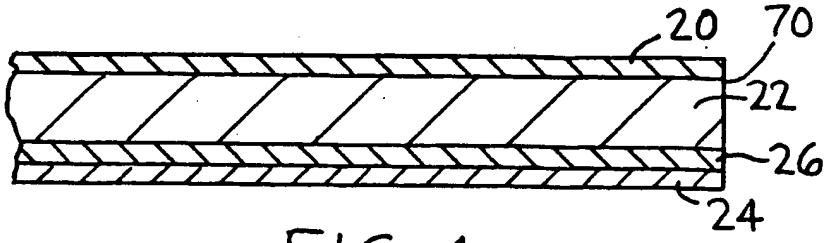


FIG. 4

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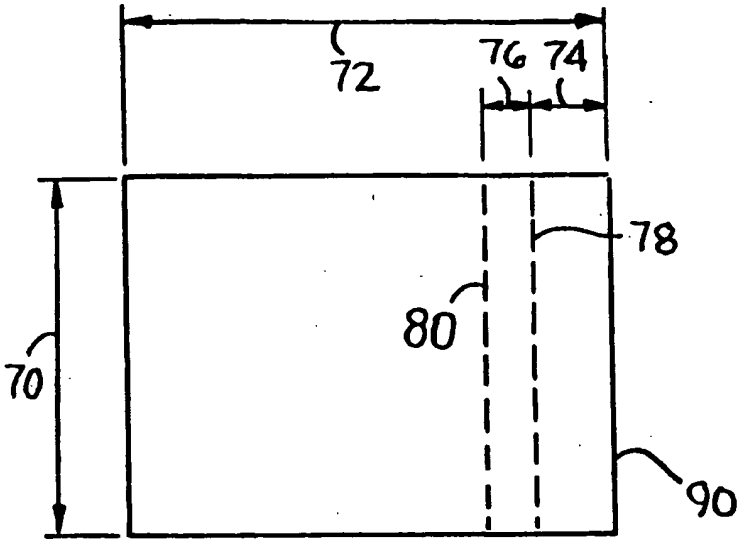

FIG. 5

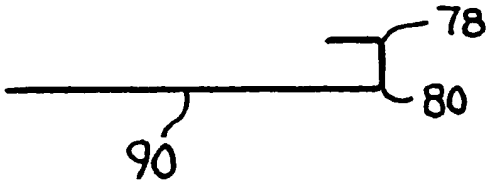

FIG. 6

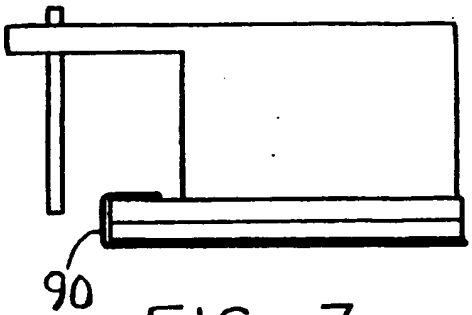

FIG. 7

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